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Z A P !

Zoo Activity Packet

Ocean Life

A Teacher's Resource
for Grades 2–6

Ocean Life

ZAP!

Zoo Activity Packet

Table of Contents

Learning Objectives	page 3
Indiana Academic Standards for Science	page 3
Background Information for the Teacher	page 4
Pre-Visit Activities	page 10
At-the-Zoo Activities	page 19
Post-Visit Activities	page 27
Teacher's Answer Key	page 36
Animal Fact Sheets	page 37
Evaluation Form	page 42

Learning Objectives

The worksheets and activities suggested in this packet will help students to:

1. Locate and correctly label the five oceans of the world.
2. Use a variety of sources to research and discover facts about ocean animal groups.
3. Create an ocean food chain.
4. Record personal observations of ocean life in the zoo's Sharks, Rays, & Jellyfish exhibit.
5. Discuss the importance of camouflage for survival in the oceans.
6. Create ocean-themed poetry and stories.

Indiana Academic Standards for Science

This packet meets the following Indiana Academic Standards for Science:

Grade 2
2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6, 2.1.7, 2.2.2, 2.3.1, 2.3.5, 2.4.2, 2.4.5, 2.5.3, 2.5.5, 2.6.2, 2.6.3

Grade 3
3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.2.2, 3.2.3, 3.2.6, 3.2.7, 3.4.8, 3.5.1, 3.5.3, 3.5.5, 3.6.3, 3.6.4, 3.6.5

Grade 4
4.1.1, 4.1.2, 4.1.3, 4.2.2, 4.2.4, 4.2.5, 4.3.3, 4.3.4, 4.3.13, 4.6.1, 4.6.3

Grade 5
5.1.2, 5.1.3, 5.2.4, 5.2.7, 5.2.8, 5.3.4, 5.3.5, 5.3.8, 5.3.12, 5.4.7, 5.5.7, 5.5.8, 5.6.1, 5.6.4

Grade 6
6.1.2, 6.1.6, 6.2.2, 6.2.5, 6.2.6, 6.3.9, 6.3.20, 6.4.3, 6.4.8, 6.4.9, 6.4.10, 6.5.2, 6.7.2

Ocean Life: Background Information for the Teacher

From outer space, the Earth looks like a blue sphere. The blue color comes from the oceans, which cover two-thirds of our planet.

Altogether, the five oceans, which all connect to each other, cover 145 million square miles of the Earth's surface. Take a minute to locate the Atlantic, Pacific, Indian, Arctic, and Antarctic Oceans on a globe. These oceans are the foundation of all life on Earth.

Salt water vs. Fresh water

The oceans are made up of salt water, unlike rivers and streams, which are made up of fresh water. Salt water tastes "salty," but it contains much more than plain old salt like we use at the dinner table. Dissolved particles (known as salts) of every element on earth – from sodium to gold – are present in seawater, although some are present in trace amounts only.

The Water Cycle

Most animals, including humans, cannot drink salt water, but the oceans help to create the water we drink through the water cycle. Water evaporates from the oceans and other bodies of water. The water then condenses into clouds, which deliver rain back to the Earth. The rainwater collects into lakes, rivers, and streams, where it is available for people and animals to drink. This water eventually flows back to the oceans.

Life in the Oceans

Although it may appear to be nothing but a huge expanse of water, the ocean is teeming with life. Within the ocean are many habitats, each supporting different types of plants and animals. These range from microscopic plankton to some of the largest creatures on Earth, like the blue whale.

In general, the variety of living things in the oceans decreases as you move away from coastlines and as you move deeper into the ocean. This means that the greatest variety of ocean-dwelling plants and animals lives near the surface of the water and close to land masses.

On the Surface

Sunlight penetrates about 300 feet into the water, creating a "sunlight layer" in the ocean. It is here that we find more than 90% of all known marine species. Sunlight creates the basis for the marine food chain: tiny phytoplankton (plant plankton) use sunlight to make food, much like green plants on land. These microscopic phytoplankton are eaten by tiny zooplankton (animal plankton), which are eaten by larger animals, which are eaten in turn by still larger animals. At the top of the marine food chain are predators like sharks and humans.

Going Down

Below 300 feet, very little sunlight penetrates the water. Plants cannot grow here. Some of the animals that live in this zone swim up to the sunlight zone each night to feed on the plankton there. Others prey on fish that live in this "twilight zone."

The Deep Dark Ocean

Below 3,000 feet, the ocean is dark and nearly empty of life. The water temperature is near freezing, and

the water pressure may be more than two tons per square inch. Very few creatures can survive in these harsh conditions. A few, like crabs, snails, hagfish, and sleeper sharks, feed on bits of food that filter down to the sea floor.

Ocean Animals

This section will highlight the animal species that live in the zoo's Australian Adventure Aquarium exhibits, including the new Sharks, Rays, & Jellyfish exhibit.

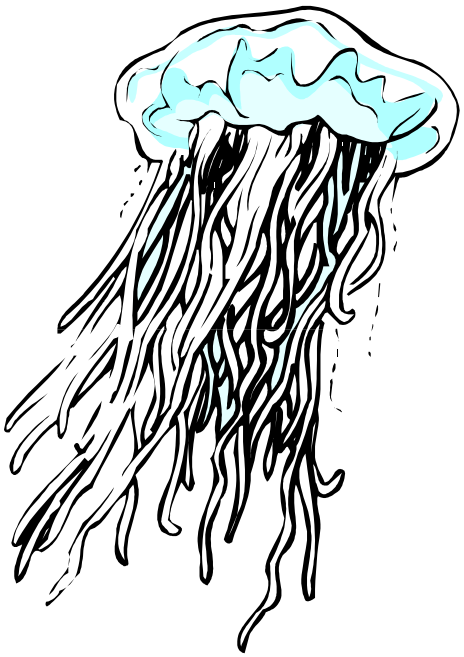
The Animal Kingdom can be divided into two large groups: Animals with backbones (vertebrates) and animals without backbones (invertebrates).

Vertebrates have a spinal cord, which is protected by vertebrae (the backbone).

Invertebrates have no spinal cord or backbone. They have no internal skeleton to support their bodies. Instead, some have hard external skeletons (like crabs and lobsters), which they shed or *molt* as they grow. Others, like clams and snails, secrete a hard shell. Some, like worms or octopus, have soft bodies with no hard external covering at all.

Invertebrates in the zoo's Aquarium exhibit:
Jellyfish
Coral (fiberglass models only, no living coral is used in the exhibits)

Vertebrates in the zoo's Aquarium exhibit:
Tropical fish
Sharks
Rays



Jellyfish

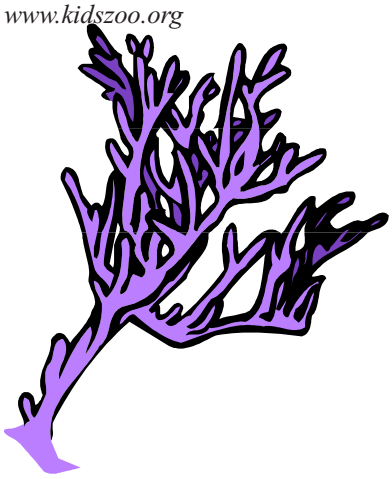
The jellyfish's body consists of a "bell" or medusa, trailed by tentacles. The jelly floats on the ocean currents, and can pulse the bell to propel itself through the water.

Jellyfish are best known for their stinging tentacles. They sting to kill their food and defend themselves.

Each of the jelly's tentacles is covered with tiny stinging cells, called *nematocysts*. When a fish or other small animal runs into the jellyfish's tentacles, the stinging cells release thousands of tiny, harpoon-like barbs, which inject paralyzing toxin.

Once used, stinging cells are discarded and replaced within two days.

Jellyfish stings range from barely noticeable to deadly. The sting's intensity depends on the type of jellyfish (there are 2,000 different kinds) and the type of food they eat (tiny plankton or larger fish).



Coral

Coral is a living animal. Hundreds of tiny coral polyps secrete a hard exoskeleton and live together in a colony. The coral animals feed on tiny plankton that float in the water.

All of the coral in the zoo exhibits is artificial. The coral is made of fiberglass, molded from real corals. Live coral is difficult to maintain in aquariums, especially in the large quantities that would be needed in this exhibit. Because many coral reefs are endangered, removing large amounts of live coral from the wild would contribute to the reefs' decline.

Tropical Fish

Twenty-five species of tropical fish are exhibited in the zoo's reef tank. These fish have internal skeletons made of bone. The huge variety of shapes and colors reflect how the fish hide, find food, and find mates. All fish breathe with gills. Oxygenated water passes over the gills and the oxygen moves into the blood stream.

Sharks

Sharks are fish, too. They have an internal skeleton and a backbone, but their skeleton is made of cartilage, rather than ossified bone. (Your outer ear and the tip of your nose are made of cartilage). A cartilaginous skeleton gives the shark greater flexibility of movement.

Sharks keep reefs healthy by preying on weak and sick animals, leaving only healthy ones to breed new generations. Sharks have many special features that make them effective predators:

Teeth: Hundreds of razor sharp teeth line the shark's mouth, with replacements ready should any fall out.

Electrical sense: Tiny sensors called *ampullae of Lorenzini* on the shark's snout detect the weak electrical fields given off by every animal – for example, a flounder buried in the sand.

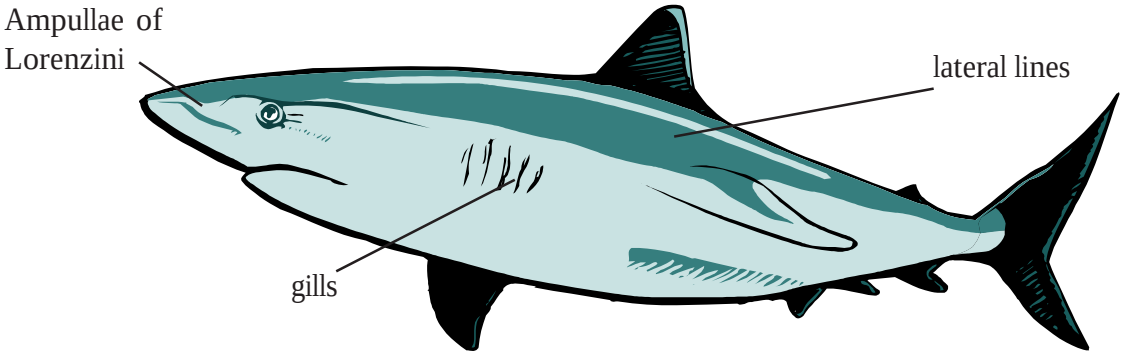
Eyesight: A reflective layer in the eye helps the shark to see clearly even in dark water.

Motion detector: Special cells in the shark's *lateral lines* – a system of tiny tubes that runs under the skin along the sides of the body – can sense an animal's movement from several hundred feet away.

Smell: Once a shark catches a whiff of its prey, it swims toward the source of the smell.

Once the prey is located (usually a fish, seabird, or seal), the shark delivers a bite with incredible force. The prey is usually swallowed whole. Many large sharks eat only once a month. They digest their food slowly and little is wasted.

Bottom-dwelling sharks don't look like "regular" sharks – they are often well-camouflaged to hide among rocks and seaweed. They feed on lobsters, crabs, and flatfish. The epaulette shark, seen in the zoo aquarium, is an example of a bottom-dwelling shark.



Shark Attacks

Shark attacks are rare, but widely publicized by the media, contributing to the shark's fearsome reputation. Every year, between two and 15 people die *worldwide* from shark attacks. You stand a greater chance of dying from a bee sting, being struck by lightning, or even being bitten by another person than being attacked by a shark. Or compare the incidence of shark attack deaths to the two to three *million* people who die each year of malaria, which comes from the bite of a tiny mosquito.

If a shark does attack a person, it's usually because the shark has mistaken a person for some other prey. For example, from below, a person on a surfboard may look like a sea lion to a shark.

Rays

Rays are close relatives of sharks. Like sharks, their skeleton is made of cartilage. Rays often dwell on the ocean floor. A ray's mouth – located on the underside of its body – is strong enough to crush even the toughest clam shell. When disturbed, a ray slaps its tail to drive a poison-covered spine deep into a victim's flesh.

Conservation Issues

The oceans are not limitless resources as many once believed. Overfishing and pollution have decimated some parts of Earth's vast waters.

Like any ecosystem, the ocean is a complex collection of living things. When one component is missing, the balance of the entire system can be thrown off.

Large fisheries, like the cod fishery in New England/Newfoundland, have collapsed because too many fish were being harvested each year. Not enough were left to reproduce and sustain the cod population.

Coral reefs die when they are overused, or when shoreline development allows silt to run off into the sea. The living coral animals are smothered with sediment, and they die. When the coral dies, (known as bleaching, because the coral skeletons are white), the entire reef community dies.

Sharks in danger

Sharks play a crucial role in ocean ecosystems, but human interference has caused shark numbers to drop at an alarming rate. Thirty to 70 million sharks are caught each year, far more than can be sustained through natural reproduction. To make sharkfin soup, which is popular in many Asian countries, sharks are caught

and tossed back into the ocean to die after their fins are removed. Millions of pounds of shark are sold in Great Britain as "fish and chips." Commercial and sport fishing have also drastically reduced shark populations.

The future

Many groups and individuals around the world are working to protect our ocean resources. New laws are being enacted to prevent overfishing. Awareness is being raised to inform consumers about fish that are rare and should avoid being eaten. People are raising more fish on farms to reduce the demand for wild-caught fish.

Vocabulary

Cartilage	A flexible tissue that composes the skeleton of some vertebrates (sharks) and portions of the skeleton of other vertebrates (the outer ear and nose of humans)
Condense	To become a liquid; to change from a gas to a liquid
Evaporate	To become a vapor; to change from a liquid to a gas
Exoskeleton	An outer supportive covering of an animal
Food Chain	The process through which energy is passed among living things in an ecosystem
Invertebrate	An animal without a backbone or spinal cord (insects, jellyfish, corals, clams, etc.)
Marine	Of or relating to the ocean
Molt	To shed an outer layer periodically
Phytoplankton	Microscopic plant life found floating in the top layer of the oceans
Predator	An animal that eats other animals
Prey	An animal that is eaten by other animals
Toxin	A poisonous substance produced by an animal or plant
Vertebrate	An animal with a backbone or spinal cord (birds, mammals, reptiles, fish, sharks, etc.)
Water Cycle	The process of evaporation and condensation through which water enters the atmosphere and is returned to the Earth
Zooplankton	Microscopic animal life found floating in the top layer of the oceans

Pre-Visit Activities

Before you visit the zoo on your field trip, try these activities to familiarize your students with the animals you will study at the zoo:

- Have students become familiar with the world's oceans by labeling the oceans on a globe or map. A map worksheet is included in this packet on page 11.

- Conduct some simple experiments to help students understand the water cycle. See page 12 for ideas. Explain that each raindrop we see was once part of the ocean.

- Experiment with salt water to learn how it is different from fresh water. Some simple experiments are described on pages 13-14.

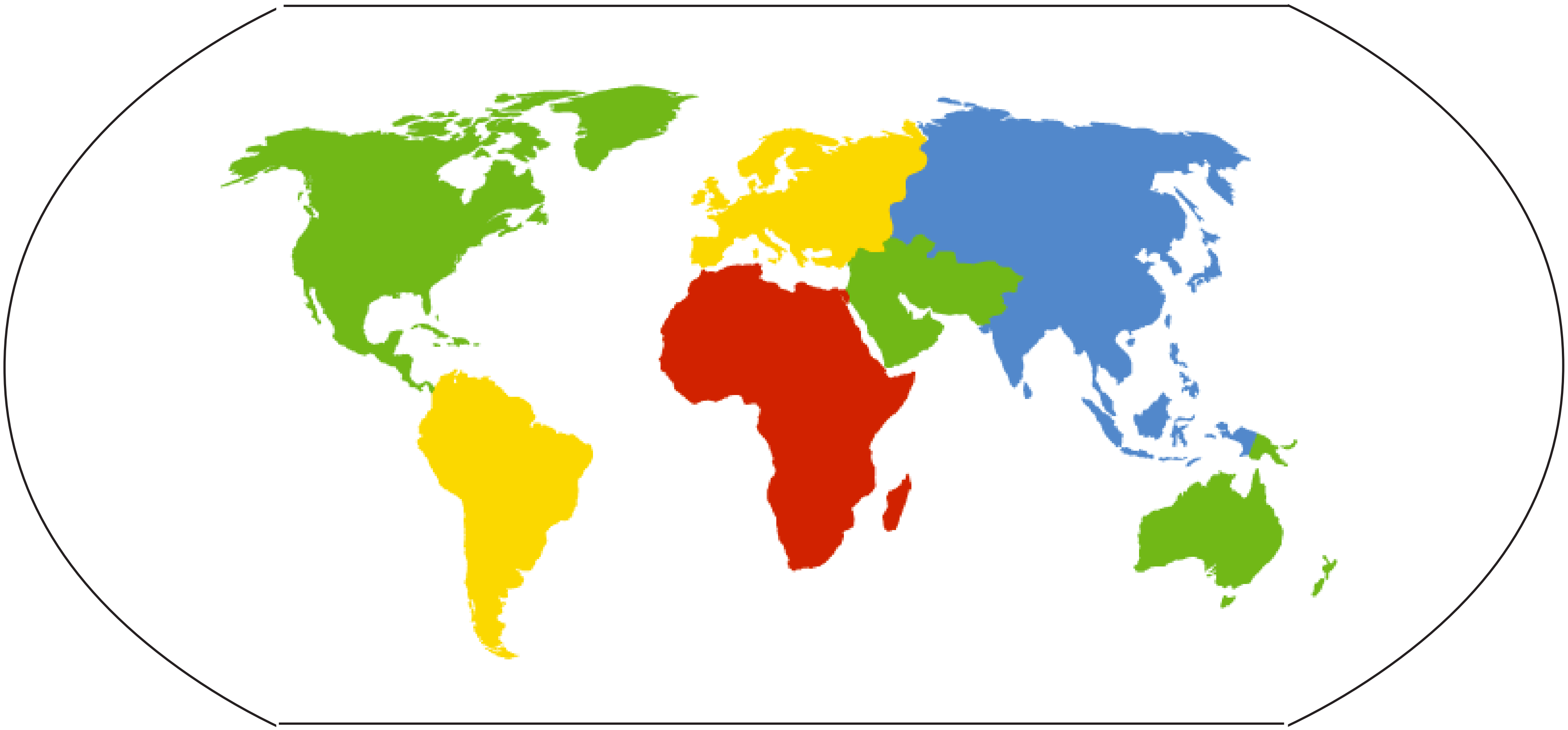
- Assign students an ocean animal to research. Use the form on page 15 for the completed reports. Be sure to suggest invertebrates such as sponges, corals, anemones, urchins, sea stars, crabs, sea pens, sea fans, tube worms, sea horses, jellyfish, clams, oysters, shrimp, and others, in addition to fish, whales, sharks, dolphins, sea lions, etc.

- After students have completed the Animal Research work sheet, ask each student to explain what their animal eats, and what eats their animal. Use this information to create a food chain of animals that live in the ocean. Explain that a complex web of food chains helps to keep the ocean ecosystem in balance.

- To prepare for viewing the coral reef at the zoo, explore the properties of coral. Use the worksheets on page 17-18 in this packet to assist you.

Name ____________________

Label the World's Oceans



Atlantic Ocean **Pacific Ocean** **Indian Ocean** **Arctic Ocean** **Antarctic Ocean**

Understanding the Water Cycle

Students will understand how evaporation and condensation work together to create the water cycle.

Playing with Puddles

Find a puddle outside on the playground or sidewalk. Watch it for a few days. Does it get bigger or smaller? Mark the edges with chalk or small rocks. Does the puddle shrink more on cloudy days or sunny days?

Build a Terrarium

Construct a small classroom terrarium and observe a miniature water cycle in action. Place a layer of soil in a large jar with a tight-fitting lid. Add a few small plants. Water the soil lightly and put the lid on. Have students watch the terrarium closely. Are there certain times of day when condensation forms on the walls of the terrarium? Keep notes in a daily journal.

Explore Evaporation and Condensation

How does water get into the air?
Rub a wet towel or sponge on the chalkboard. What happens to the wet spot over the next few minutes? Where does the water go? Wet the chalkboard again. What happens if you move air across the chalkboard (with a fan or a towel)? What happens if you heat the chalkboard with a lamp? Write down your observations.

How does water change from a gas to a liquid?

Find a heat-resistant dish with a lid. Put the lid in a freezer for 30 minutes. Meanwhile, use a hot plate to warm up the dish. Turn off the hot plate. Place the lid on the dish. What happens? Explain that the water droplets are like the rain that condenses in the atmosphere and forms clouds.

Adapted from Teacher Created Materials/Oceans -Primary

Salty Solutions

Try these simple experiments to learn more about salt water.

To make your own salt water for use in these activities: Mix two tablespoons aquarium, kosher, or canning salt in one quart of water. Store the water in airtight containers until needed.

How do we know that sea water contains salt?

Pour a small amount of your homemade salt water into a paper cup for each student. Have the students taste, touch, and smell the water. What does it taste like? Write students' observations on the board or have them write their observations in a "Salt Water Journal." (Be prepared to allow students to get a drink of fresh water after this experiment.)

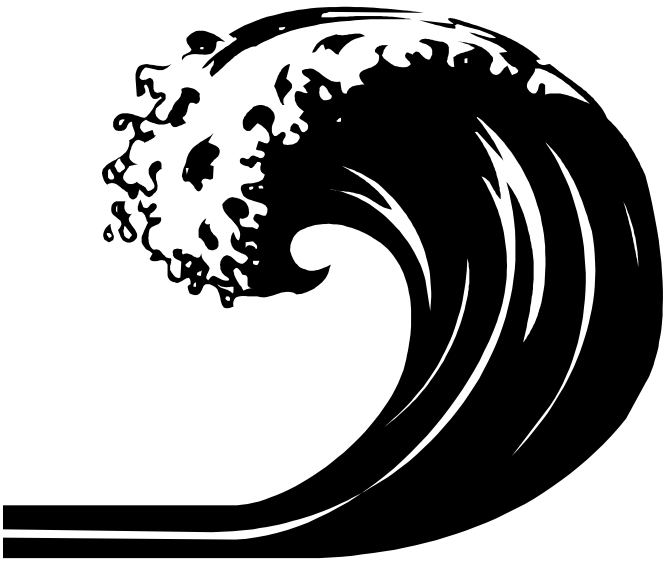
Pour a cup of your salt water solution into an aluminum pie plate. Set the pie plate in a warm, dry place. Ask students to predict what will happen to the water and record their predictions. Let the pie plate sit undisturbed for a few days so the water will evaporate. Have students record their daily observations if you wish.

After the water evaporates, take a closer look at what's left in the pan. What does it look like? How does it feel? What does it smell and taste like? Write students' observations on the board or have them write their observations in a "Salt Water Journal."

As an extension, have students examine the crystals with magnifiers, then draw pictures of the crystals in their journal.

Warm and Cold Seas

Put one cup of your salt water mixture into a container. Add 4 or 5 drops of food coloring into the solution and refrigerate it for at least two hours. Mix 1 1/2 teaspoons of salt into one cup of warm tap water. Be sure the warm water is in a clear plastic cup.

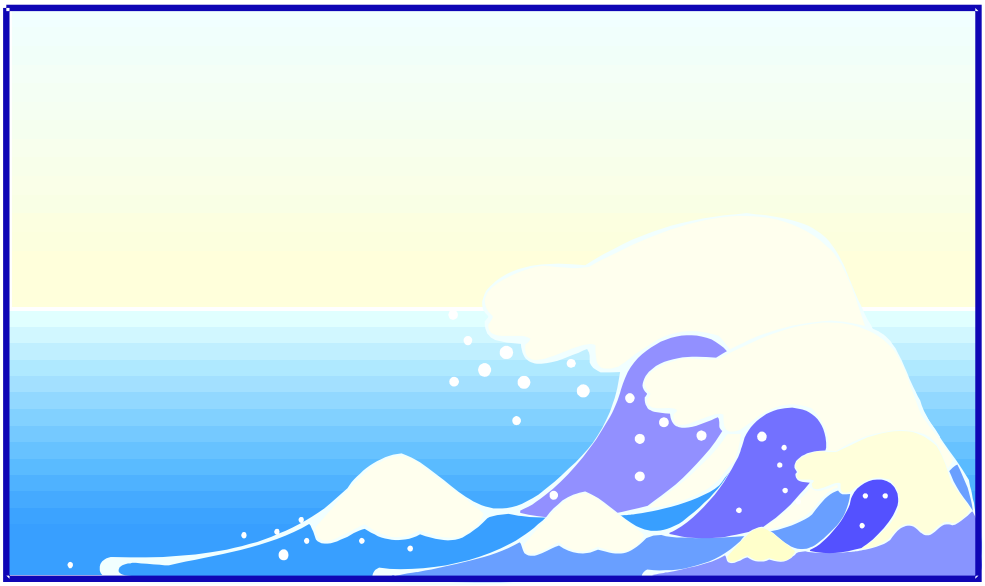


Before you mix the two, ask students to predict what will happen when the cold water is mixed with the warm water. Record the predictions.

With an eye dropper, put about 20 drops of the cold, colored salt water into the clear cup of warm salt water. What happens? Have students record their observations.

Note: The cold, colored salt water should sink below the clear, warm water. Explain that warm salt water is less dense than cold salt water, so it

floats on top. In the ocean, the coldest waters are found at the bottom of the ocean, while warmer waters are found at the surface.



Extension: Try this experiment in the opposite way. Use clear cold water, and add food coloring to the warm water. Does the same thing happen when the two are mixed together?

Creating Currents:

Mix food coloring into enough salt water solution to make 4 ice cubes. Pour the colored water into 4 sections of an ice cube tray and freeze. Ask students to predict what will happen when these ice cubes are mixed with clear warm tap water. Record the predictions.

Fill a clear 9" x 13" baking pan with warm tap water. Place the 4 colored salt water ice cubes along the edge of the baking pan. Hold them in place to keep them from floating away. Watch along the side of the pan as the ice cubes melt. What happens? The melting ice water should sink straight to the bottom and traveled along the bottom of the pan to the far end. Explain that this same phenomenon happens in the oceans, when ice from the polar regions melts. The cold, denser water sinks and flows toward the equator, creating important cold-water currents that influence ocean circulation, which in turn influence ocean life.

Adapted from Ranger Rick's Naturescope Series - Diving into Oceans

Animal Research

Your Name_____

Choose an ocean animal to research. Look up information about your animal in books, magazines, encyclopedias, or on the internet. Use the information you find to fill out the chart.

Name of Animal _____

Which animal group does it belong to? (Is it a mammal, fish, invertebrate, or something else?)	
Tell about your animal's size, including weight and height.	
Describe your animal's coloring.	
Does it have a backbone? If not, describe its exoskeleton.	
Does it have any special body parts?	
What does your animal eat?	
What eats your animal?	
Describe your animal's habitat.	
Write an interesting fact about your animal.	
On the map, show the parts of the ocean where your animal is found.	

Draw a picture of your animal in its habitat on the back of this page.

Name_____

An Ocean Food Chain

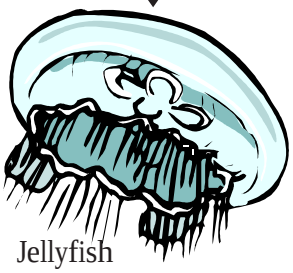
The ocean is a lot more than just water. Many plants and animals find food there.

Ocean animals eat the plants and animals they find nearby. Tiny *phytoplankton*, which make their own food, are eaten by tiny *zooplankton*. The zooplankton are eaten by larger animals, which are eaten by still larger animals, and so on.

After you have completed the Animal Research worksheet, help your teacher make a list of foods that ocean animals eat and who eats them. Use this information to make your own ocean food chain. An example is shown for you. Add pictures or drawings if you like.

Phytoplankton

Zooplankton



Jellyfish

Sea Turtle

Looking at Coral

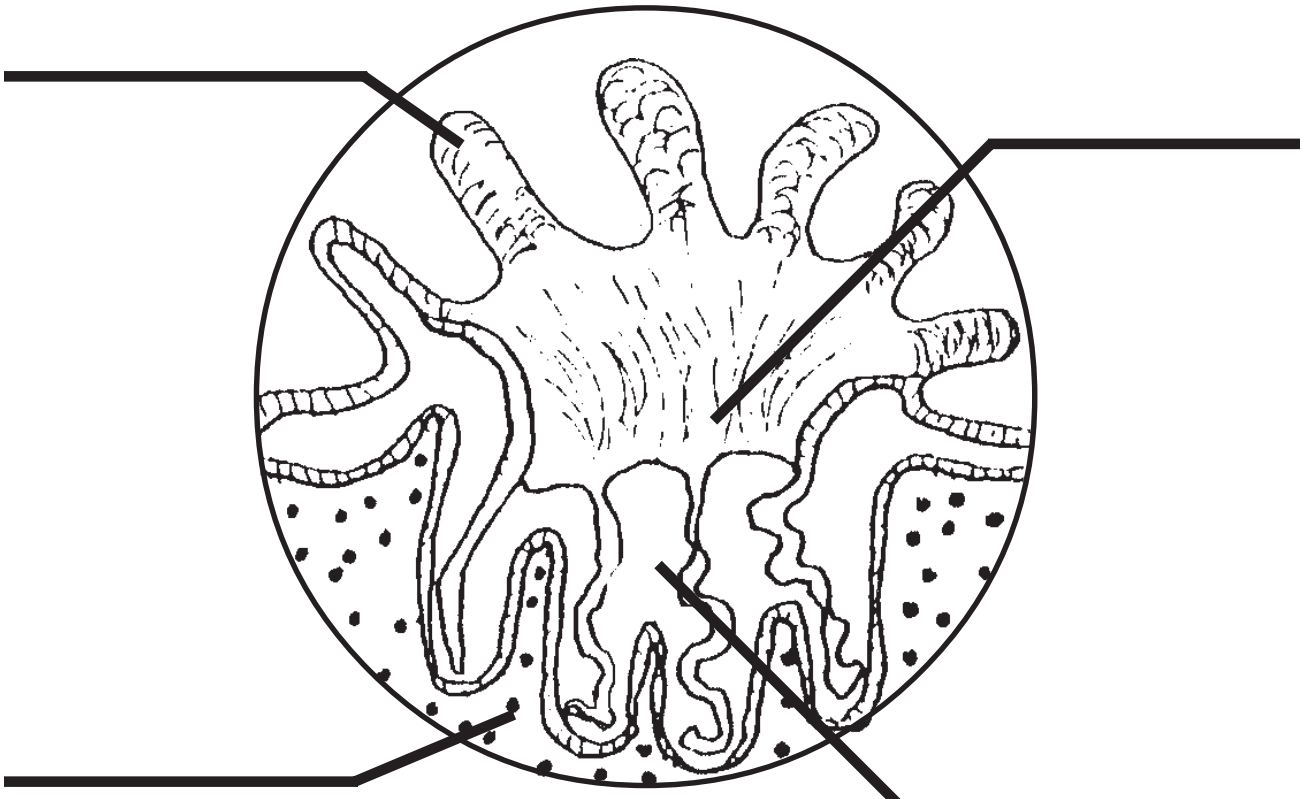
Polyps are the tiny, often microscopic marine animals that build the hard coral skeleton for their home. The polyps live together in a colony. One coral colony may contain thousands of individual polyps. Colonies take on many different shapes: fans, tubes, branching, or mushroom-like, to name a few. There can be millions of coral colonies on a coral reef.

The coral polyp extends its **tentacles** to gather tiny bits of floating food, which are called plankton. The food is then digested in the polyp's stomach. When the polyps are frightened or resting, they pull the tentacles inside the hard limestone skeleton.

The stony skeleton is the home of the coral. The polyp uses calcium carbonate found in the sea water to gradually build up its hard skeleton. Just think: these tiny animals have built huge reefs like Australia's Great Barrier Reef.

Label the four main parts of this polyp. It is shown in cross-section, so that you may see the inside of the polyp. Use these words:

mouth **hard coral skeleton** **stomach** **tentacles**



Coral Polyp

Great Barrier Reef

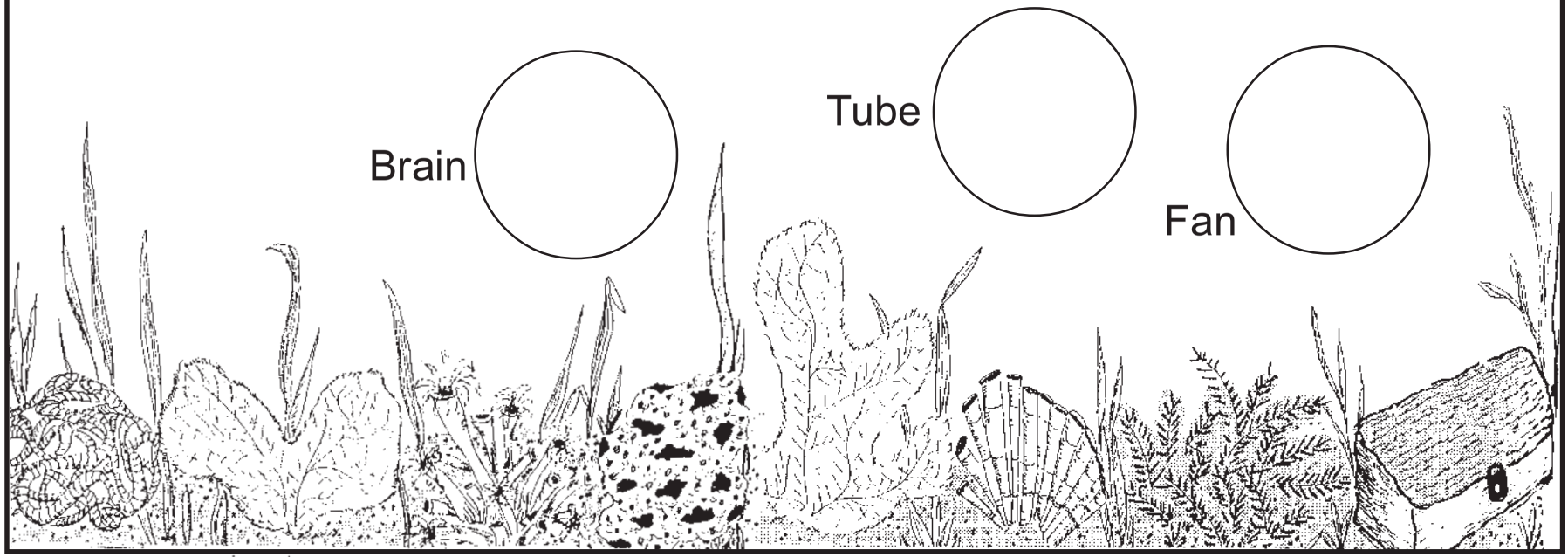
One of Australia's greatest tourist attractions is the Great Barrier Reef. This colorful coral reef stretches 1,250 miles along the north-east coast of Australia. Many species of fish live there because food and shelter are plentiful. The ocean water is warm, and there is lots of sunlight. These conditions are just right for the coral polyps (tiny marine animals) to grow and produce their hard, coral "skeletons."

Many types of unusual fish can be found on the Great Barrier Reef. The queen angelfish is a favorite of tropical fish fanciers and the trumpet fish stalks its prey by patiently standing on its head.

There are many types of coral found on the reef. The parrot fish chews the sharp coral to get the tiny polyps out of it for food. Then the parrot fish spits out the coral sand pebbles. This fish is responsible for producing many miles of coral sand reefs.

See if you can find pictures of these corals. Draw a picture of each one. Can you tell how each got its name?

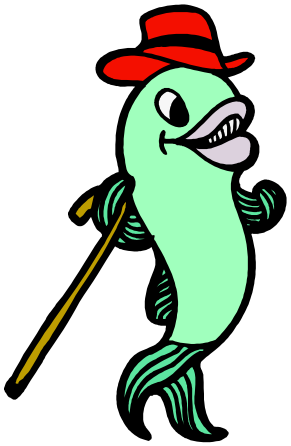
Types of Coral



Cartoon Creatures

Your Name_____

We sometimes see ocean animals in movies and TV cartoons. Write down the different ocean animals you see while watching your favorite show.



Name of show you watched_____

I saw these ocean animals on the show:

1._____ **5.**_____

2._____ **6.**_____

3._____ **7.**_____

4._____ **8.**_____

Sometimes the characters on a show do things that the real animals can't do. List five things you see the ocean animals doing on the show that these creatures <u>can't</u> do in real life:

1._____

2._____

3._____

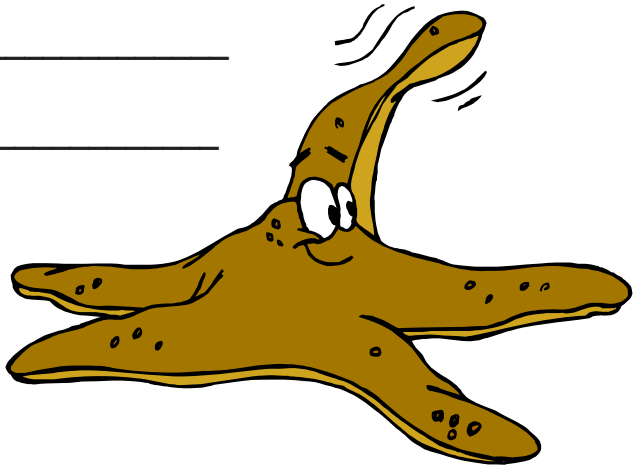
4._____

_____

5._____

_____

Why do you think the show's creators give the creatures these abilities?



At-the-Zoo Activities

When you are at the zoo on your field trip, plan for students to complete one or more of the work sheets in this packet. All of the work sheets are designed to foster and sharpen observation skills.

Use a piece of cardboard to make an inexpensive clipboard for your students. Place a rubber band around the cardboard to secure the worksheet.

In addition to the worksheets that follow, you can create your own observation activities. Here are some ideas:

- Assign an animal for students to sketch. Sketching encourages detailed observation.

- Assign students an animal to observe for 10 minutes. Students should write down everything the animal does during that time. Ask your chaperones to keep track of the time for students. (Ten minutes is far longer than most people spend at a single animal exhibit!)

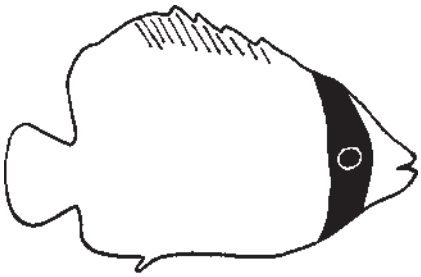
- Plan to incorporate a field trip mini-class into your day at the zoo. Classes are offered on a variety of topics and last 20 minutes. There is no charge for the classes, but you must preregister by calling 260-427-6808.

- If available, plan to observe animal feeding and training demonstrations during your visit. Information is posted at the zoo entrance. Signs at the sea lion and penguin exhibits will notify you if demonstrations are scheduled for the day of your visit.

- While touring the zoo, students should choose any two animals and list two ways that they are alike and two ways that they are different. A third animal could be added to the group and find three similarities and three differences.

Fish Tricks

Fish have spots and stripes to confuse other fish and provide camouflage. See how many fish you can find in the zoo's aquariums with these markings. Write their names on the lines.



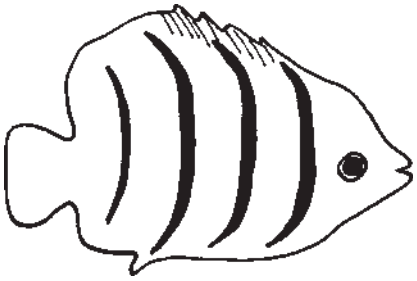
Eye Bar
The dark stripe helps hide the eye, so a predator may not know which end of the fish contains the head.

List the fish with eye bars seen in the tank

_____

_____

_____



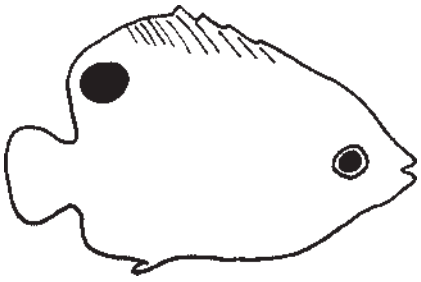
Stripes
Stripes break up the outline of the fish's body, making it hard for a predator to see the fish.

List the fish with stripes seen in the tank.

_____

_____

_____



Eye Spot
Eye spots may trick predators into mistaking the fish's tail for its head.

List the fish with eye spots seen in the tank.

_____

_____

_____

When you return to school, graph your data using the graph on page 32.

Advanced Animal Observation

My animal is _____ My Name_____

Find your animal. Use all your senses to answer these questions:

1. Sketch your animal carefully on a blank page.

2. Guess how much your animal weighs (in pounds):

3. Guess how long or tall your animal is (in inches):

4. How does the animal move from place to place?

5. How many arms? legs? wings? fins? other structures?

6. Compare the front and back legs.

7. How many toes on each foot? Does it have toenails?

8. Observe the animal for 10 minutes. Make a check mark each time it does one of the following:

Walks	Runs	Lies down	Eats	Drinks

Grooms itself	Grooms others	Yawns	Looks at people

9. If there are several animals in the group, can you tell which ones are the leaders? How can you tell?

10. Describe the coat and coloring of the animal. Include body color, face color, and markings or patterns.

11. Describe the eyes. Include color, size, and shape of pupils. Are the eyes located on the front or the sides of the head? Why do you think they are located there?

12. Describe the ears.

13. Describe the sounds made by the animal.

14. Describe the smell of the animal.

15. How is the animal like you? How is it different?

Comparing Sharks, Rays, and Tropical Fish

Choose a shark, a ray, and a jellyfish to observe at the zoo aquarium. Fill out the chart below. When you return to class, discuss how these animals are similar. In what ways are they different?

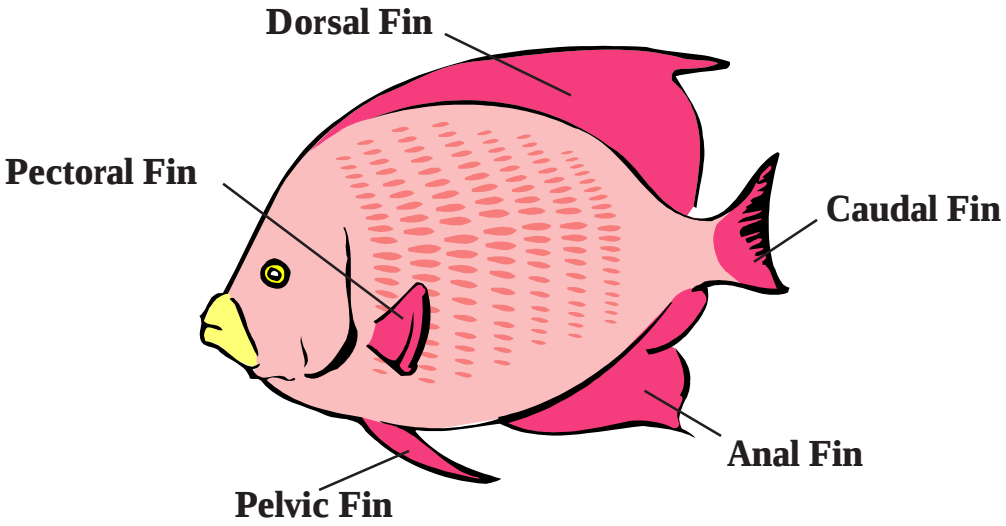
	Shark Type you observed _____	Ray Type you observed _____	Tropical fish Type you observed _____
What color is it?			
Does it ever stop swimming?			
Does it have eyes?			
Where are the eyes located?			
Where is the mouth located?			
Do you think it has a backbone?			
Estimate how long it is (in inches).			
Which fins or body parts are used to make it move?			
Does it swim alone or with others of its kind?			

Which Fin is Used to Swim?

Name_____

Fish use their fins to move through the water. But different fish use different fins for locomotion.

Look at the diagram below and notice how each fin has a different name. Remember that on certain fish, a particular fin may be exaggerated and elaborate, or tiny and hard to see. That's what makes tropical fish so unique and beautiful.



Choose a fish to observe in the zoo's aquarium. After you watch it swim for a few minutes, decide which is the primary fin used to propel the fish through the water. (Hint: This is the fin that moves the most when the fish is swimming.) Then write the fish's name in the appropriate box below. Continue until you have watched ten fish. Do you notice anything about the groups of fish you have created? When you return to school, graph your data using the chart on page 32.

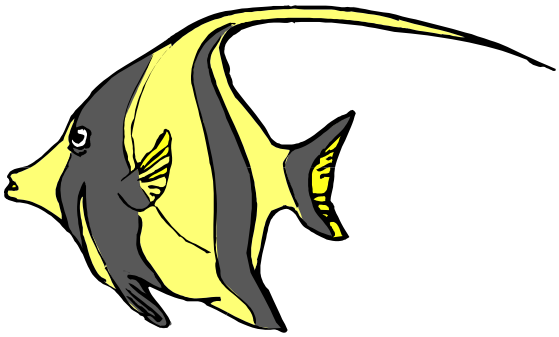
Pectoral Fin	Dorsal Fin	Caudal Fin

Pelvic Fin	Anal Fin

Can You Find...?

Name_____

Look for these creatures in the zoo's aquarium exhibits. Write the name of the animal in the blank.

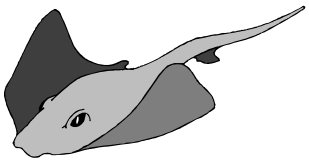


An animal whose skeleton is made of cartilage

_____

An animal that you can see through _____

An animal with at least six colors on its body _____



An animal without eyes_____

An animal that likes to hide _____

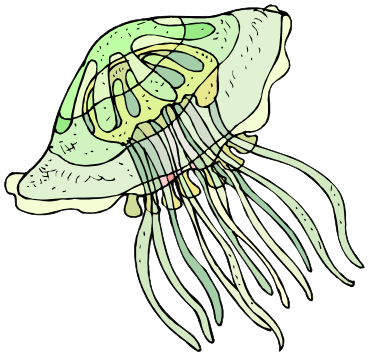
An animal that rests on the bottom of the aquarium_____

An animal that has good camouflage _____

An animal that stings_____

An animal that never stops swimming _____

_____



Post-Visit Activities

Several work sheets and activity ideas are shown on the following pages. Select a work sheet that best fits what your students accomplished on their field trip.

- If students have done work sheet activities at the zoo, go over them when you return to the classroom. Discuss their answers, ideas, experiences, and any questions they have about what they saw and did. Encourage students to discuss their reactions to the zoo. What did they like most? Least? Why? Have their feelings or ideas changed about zoos?

- Make a post-visit graffiti board. Pass around a marking pen and a sheet of cardboard or large piece of white paper stapled onto cardboard, and have students record their reactions to the field trip. Add it to your zoo bulletin board or learning center.

- Graph the data students collected on the trip. A basic graph form is included on page 32. What general trends can you infer from the compiled data?

- Decorate your classroom to resemble an ocean habitat. Have students draw colorful fish, corals, and ocean creatures. Hang them as mobiles around the classroom, as if they were suspended in water. Create a reef on a bulletin board. Plans for creating paper-plate jellyfish are included, as well as plans for an ocean in a bag.

- Have students write articles for the school newspaper or publish a newsletter about their trip for their fellow students and parents. Divide responsibilities for different topics or phases of the trip or classes of animals among the students. Encourage them to interview one another and to illustrate their stories with sketches or cartoons.

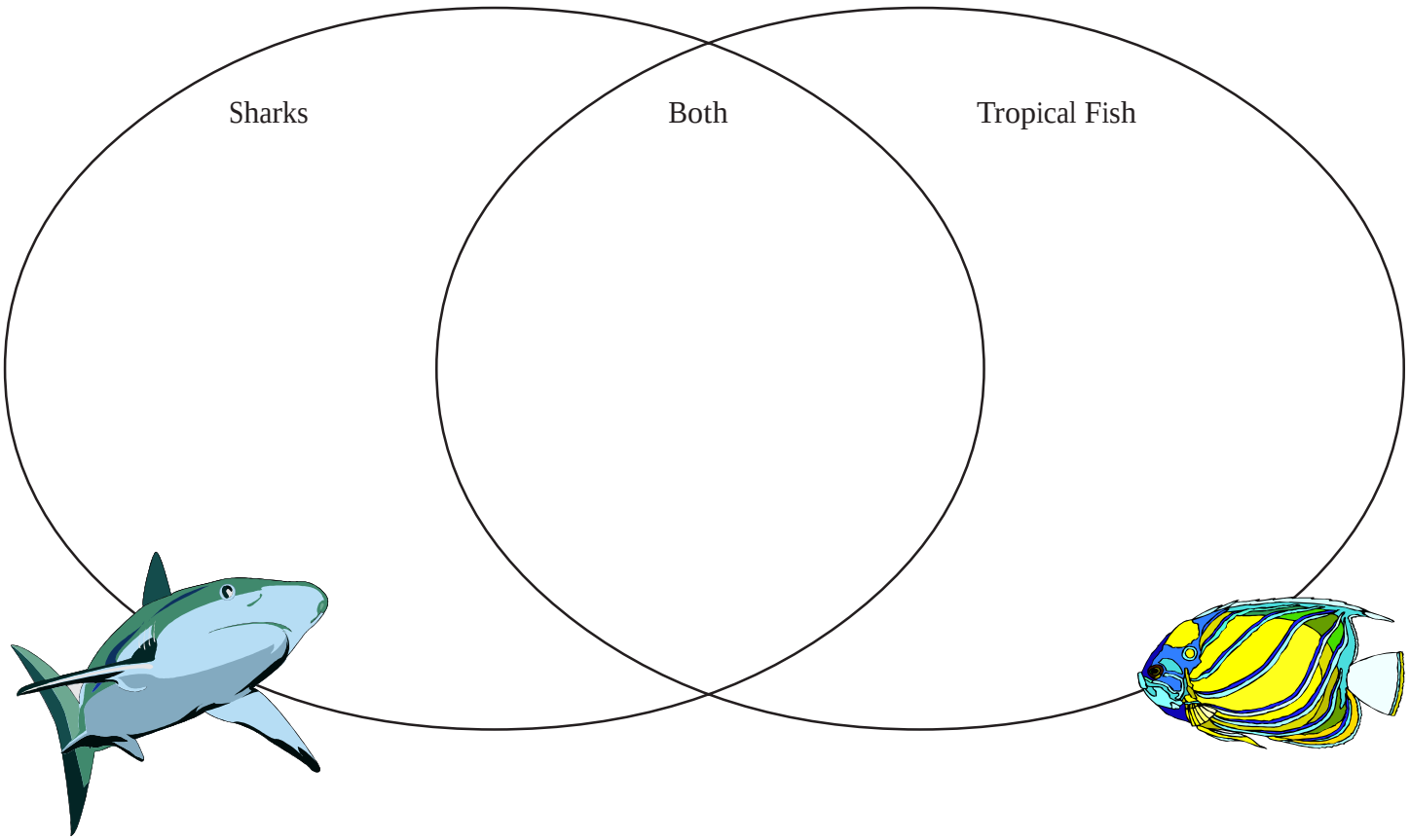
- Have a spelling bee using zoo vocabulary and animal names.

- Play animal charades. Divide the class into teams: each team must act out an animal's movements while the rest of the teams try to guess what it is. Keep track of the time for each team.

Alike and Different

Name _____

Sharks and tropical fish share many characteristics, but they also are different from one another in several ways. Use the idea bank below to fill in the Venn Diagram comparing sharks and tropical fish. Add as many characteristics as you can, based on your studies of ocean life.



Idea Bank

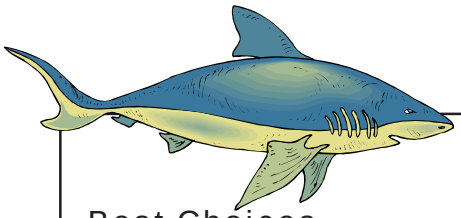
Skeleton made of bone
Skeleton made of cartilage
Live in oceans
Eat fish
Eat plankton
Eat plants
Must swim constantly
Can stop swimming and rest
Breathe with gills
Can sense electric field of living things
Colors provide camouflage
Found near coral reefs
Eaten by people
Some are endangered

Can you add more ideas on your own?

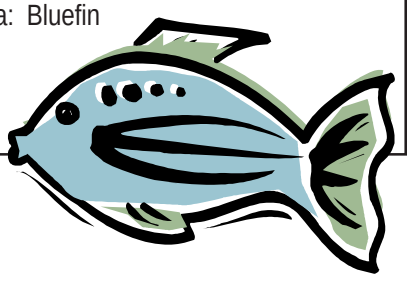
Fish for Dinner?

The fish that end up in your local grocery store might be tasty and healthy to eat, but not all fish are taken from the oceans in a responsible way. Some fish are farmed in ways that are environmentally friendly, but others are caught and sold even though the populations of wild fish are shrinking.

Visit the seafood section of your local market (some stores may sell fresh seafood, or you might have to look in the frozen food section). Check off the seafood that you find there on the lists below. How many of the animals on the "Avoid" list are at your store? How do the choices you make at the grocery store affect the creatures in our oceans? What will happen if people continue to buy these fish? What else can be done to protect our ocean resources? For more information, visit www.montereybayaquarium.org.

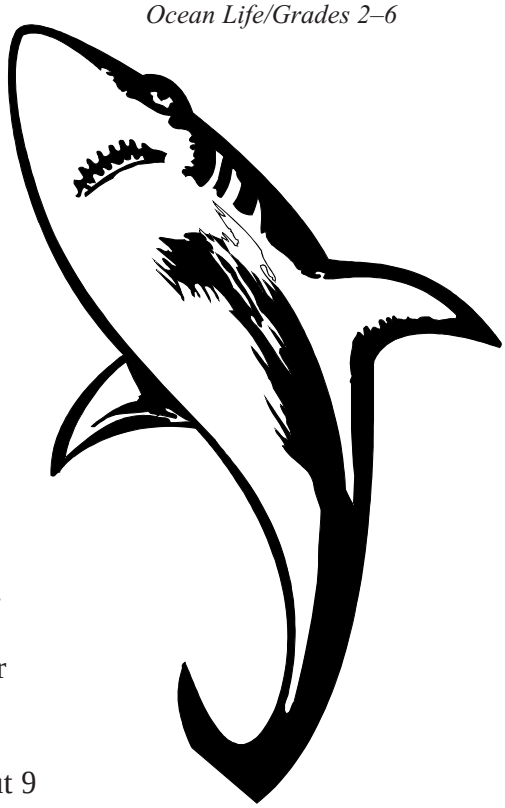


Best Choices These fish are abundant, well-managed, and caught or farmed in environmentally friendly ways.	Proceed With Caution These are better choices than seafood on the Avoid list. However, there may be some problems with the way they are caught or farmed, or scientific information is lacking.	Avoid Do not buy these products for now. These fish come from sources that are overfished or are caught or farmed in ways that harm the environment.
Catfish (farmed) Caviar (farmed) Clams (farmed) Crab: Dungeness Crab: Snow (Canada) Crab: Stone Halibut (Pacific) Lobster: Spiny/Rock (U.S./Australia) Mussels (farmed) Oysters (farmed) Salmon (Alaska, wild-caught) Salmon (canned) Sardines Shrimp/prawns (trap-caught) Striped Bass (farmed) Sturgeon (farmed) Tilapia (farmed) Trout: rainbow (farmed) Tuna: Albacore (troll/pole-caught) Tuna: Bigeye (troll/pole-caught) Tuna: Yellowfin (troll/pole-caught)	Clams (wild-caught) Cod: Pacific Crab: Blue Crab: Imitation/Surimi Crab: King (Alaska) Crab: Snow (U.S.) Flounder: Summer/Fluke Lobster: American/Maine Mahimahi/Dolphinfish/Dorado Oysters (wild-caught) Pollock Scallops: Bay Scallops: Sea Shrimp (U.S. farmed or U.S. wild-caught) Soles (Pacific) Squid Tuna: Albacore (longline-caught) Tuna: Bigeye (longline-caught) Tuna: Yellowfin (longline-caught) Tuna (canned)	Caviar (wild-caught) Chilean Sea Bass/Toothfish Cod: Atlantic/Icelandic Crab: King (imported) Flounders (Atlantic) except summer Flounder Grouper Halibut: Atlantic Monkfish Orange Roughy Rockfish/Rock Cod (Pacific) Salmon (farmed/Atlantic) Sharks Shrimp (imported) Snapper: Red Soles (Atlantic) Sturgeon (wild-caught) Swordfish Tuna: Bluefin



Reprinted from the Seafood Watch program of the Monterey Bay Aquarium

Sharks: Myth vs. Reality



Sharks have a reputation as being vicious, man-eating monsters. But is that really true? See if you can tell which of these statements are TRUE (reality) and which ones are FALSE (myth). Write "true" or "false" on the line next to each statement.

_____ 1. More people are bitten by squirrels each year than are bitten by sharks.

_____ 2. Whenever a shark loses a tooth, a new one grows in its place.

_____ 3. Sharks can smell blood in the water from miles away.

_____ 4. Some sharks can make their body 27 degrees warmer than the water around them.

_____ 5. Of the 400 species of sharks in the world, only about 9 have ever killed people.

_____ 6. Some sharks are endangered because people are taking too many from the ocean.

_____ 7. Sharks might eat only once every month or two.

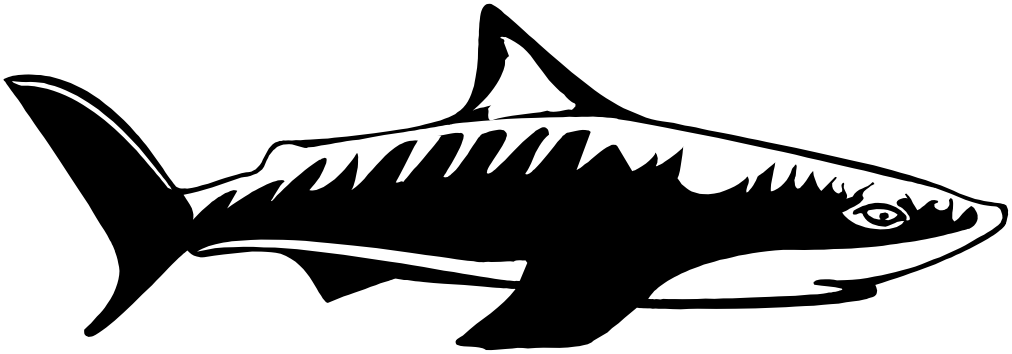
_____ 8. Most sharks eat seals, sea lions, and fish.

_____ 9. Some sharks are only a few feet long as adults.

_____ 10. Shark skin is so rough that at one time, people used it as sandpaper.

_____ 11. The world's largest fish is the 40-foot-long whale shark. It feeds on tiny plankton.

_____ 12. Sharks are found in oceans all over the world, including the polar seas.



Make a Jellyfish

Students can make a colorful jellyfish to hang up or wear on their heads.

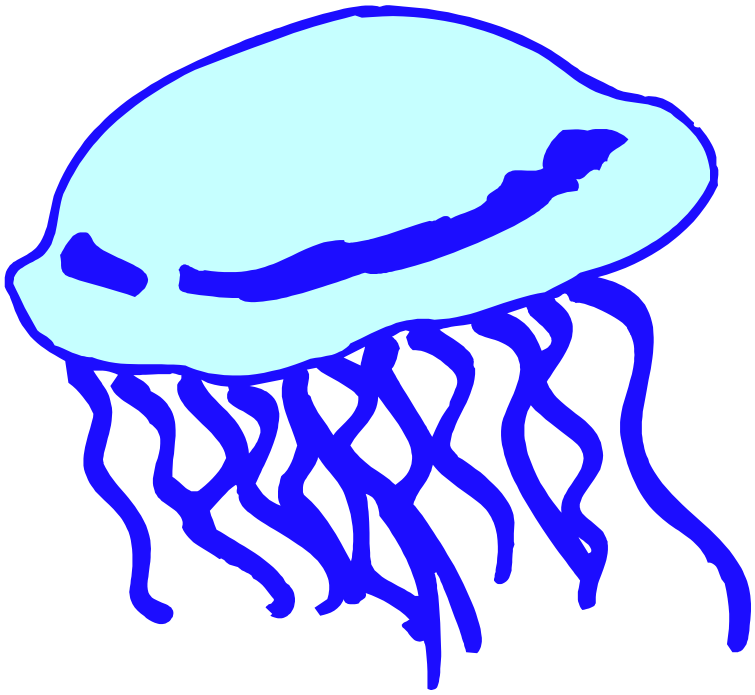
Materials

- paper plates
- ribbon
- scissors
- tape
- crayons or markers
- pictures of jellyfish

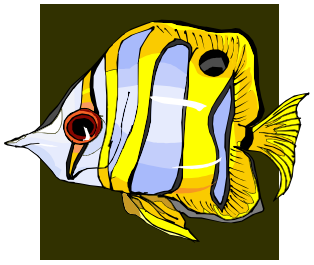
Look at pictures of different kinds of jellyfish.

Cut the ribbon into various lengths from about 8 to 18 inches long. You'll need about 30 pieces for each jellyfish. Curl some of the ribbon, and leave other pieces flat. These will be the "tentacles."

Color the plate or "body." Use tape to attach the ribbon to the inside of the plate. Most of them should go near the edge of the plate. When you turn the plate over, the tentacles will hang down like a real jellyfish.



Fish Graphing



Use the grid below to graph some of the observations you made while visiting the zoo. Compile the data collected by the whole class, or graph the information you collected by yourself. Some examples of the completed work sheets you could graph include:

- Which Fin is Used to Swim?
- Fish Tricks
- Advanced Animal Observations

Ocean Poetry

The beauty of the sea has inspired poets for centuries. Think about the ocean animals you saw on your visit to the zoo. Then try some of the ideas below to create your own poem.

Example:

J jiggly
E elegant
L long
L lingering
I icky
E effortless
S stingers

Try these:

O_____ **S**_____
C_____ **H**_____
E_____ **A**_____
A_____ **R**_____
N_____ **K**_____
S_____

Haiku is a form of Japanese poetry that has five syllables in the first line, seven in the second line, and five in the last line. An example is shown. See if you can write your own haiku about ocean animals.

The deepest blue sea
Swallows up the biggest fish
While waves crash on shore

Try your haiku here _____
_____
_____

Animal Cinquain

This unique form of poetry uses words to carefully describe animals

Example:

Clownfish
Bright stripes
Hiding in anemones
You make me smile
Colorful

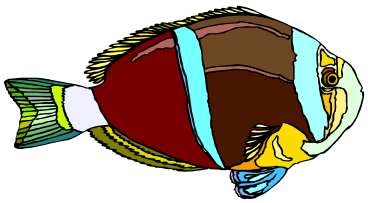
(1 word - animal)

--- ---
(2 words that describe the animal)

--- --- ---
(3 words expressing action)

--- --- --- ---
(4 words telling how you feel about it)

(sum up with 1 word)



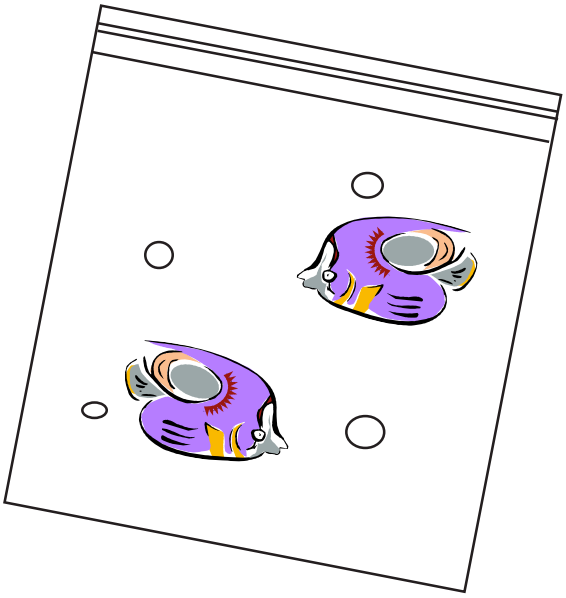
Ocean in a Bag

Fill a recloseable plastic bag with blue hair gel. Make sure the gel covers the inside of the bag completely when the bag is flattened out.

Cut out fish shapes from foam trays or plates. Use colored foam if you can; otherwise decorate your fish with permanent markers. Put the fish in the gel-filled bag. Add some seashells and plastic beads if you like.

Squeeze out as much of the air as you can. Zip the bag shut, tape the end, and place it inside another recloseable bag. Zip the second bag shut, too.

When you rub your hands over the bag, the fish will "swim" in the "ocean"!



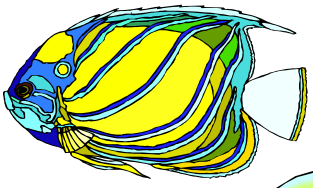
Adapted from *Crafts for Kids Who are Wild About the Wild* by Kathy Ross

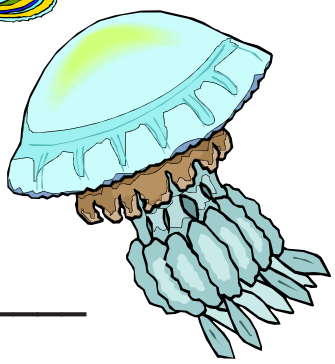
Ocean Stories

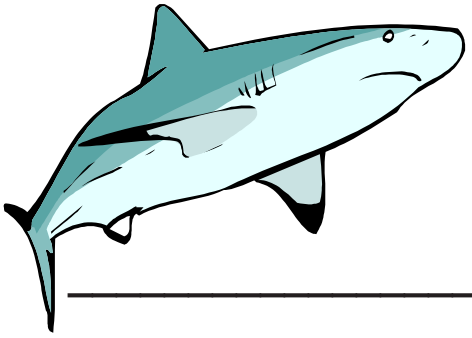
Name_____

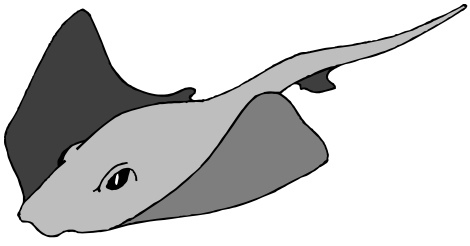
Write a story about the ocean. The first sentence of the story has been started for you.

If I lived in the ocean . . ._____









Teacher's Answer Key

Can You Find... (page 26)

There are several correct answers for each question. Some possible answers are listed here.
An animal whose skeleton is made of cartilage: Sharks, rays
An animal that you can see through: Jellyfish, some tropical fish
An animal with at least six colors on its body: Many of the tropical fish in the tank would qualify, including butterflyfishes, triggerfishes, surgeonfishes, and more
An animal without eyes: Jellyfish
An animal that likes to hide: Rays, eel, flame hawkfish
An animal that rests on the bottom of the aquarium: Epaulette shark, zebra shark
An animal that has good camouflage: Epaulette shark, zebra shark
An animal that stings: Jellyfish; also triggerfish and rays have poisonous spines
An animal that never stops swimming: Sharks, some tropical fish

Alike and Different (page 28)

Sharks
Skeleton made of cartilage
Must swim constantly
Can sense electric field of living things
Found near coral reefs

Both
Live in oceans
Eat fish
Breathe with gills
Colors provide camouflage
Eaten by people
Some are endangered

Tropical fish
Skeleton made of bone
Can stop swimming and rest
Eat plankton
Eat plants

Sharks: Myth vs. Reality (page 30)

All of the statements are TRUE.

Animal Facts:
Tang (Surgeonfish)

Family: Siganidae

Scientific Name: *Zebrasoma xanthurus*

Range: Atlantic and Pacific oceans

Habitat: Coral reefs

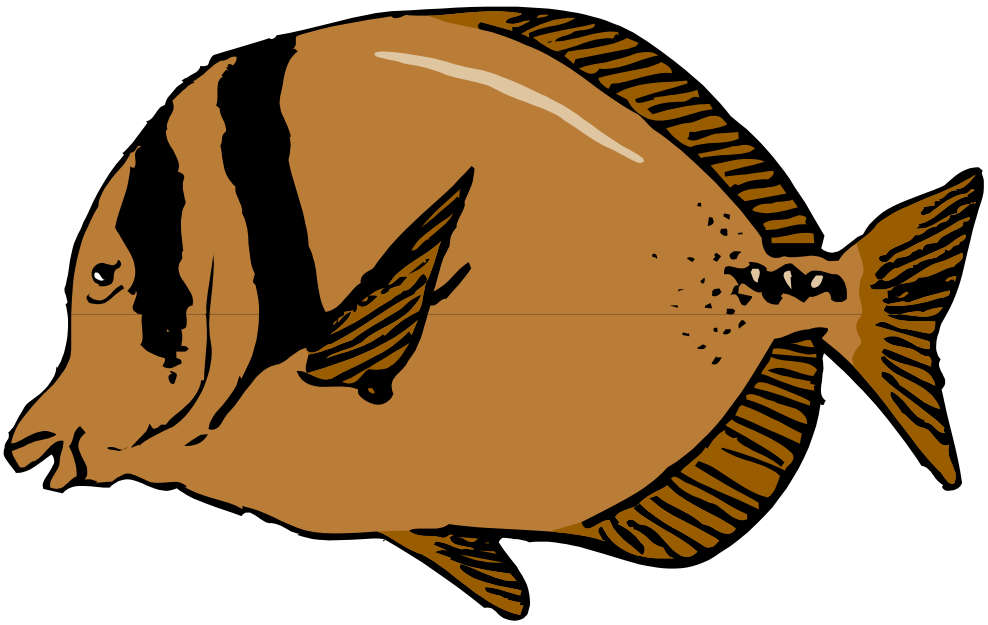
Natural Diet: Mostly herbivorous, they feed on algae

Zoo Diet: Broccoli, peas, capelin (small fish)

Physical Characteristics: The tang is 8-12 inches long and is oval and compressed. It has a hard "beak" used to scrape algae from rocks.

Behavior: The tang is very active. It is constantly browsing and always on the move. The tang rests at night by hiding within the crevasses of a coral reef.

Reproduction: Tangs reproduce by external fertilization. Females lay eggs, and males release sperm to fertilize the eggs. The young of the blue tang begins life a bright yellow color, with blue spots near the eyes, then becomes a solid blue color as an adult.



Animal Facts:
Cownose Ray

Family: Myliobatidae

Scientific Name: *Rhinoptera bonasus*

Range: Southern New England to northern Florida; throughout Gulf of Mexico. Migrates as far south as mid-Brazil

Habitat: Bottom of shallow bays and inshore shelf

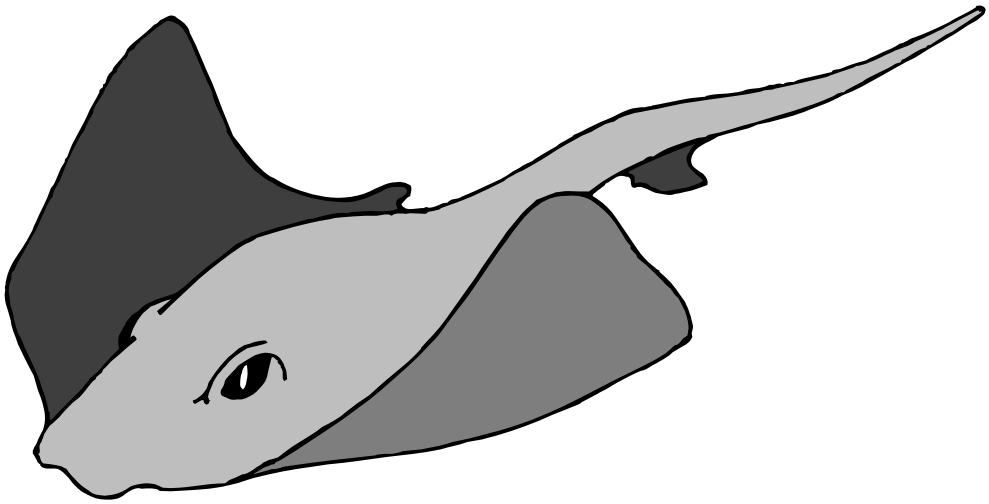
Natural Diet: Hard-shelled mollusks and crustaceans

Zoo Diet: Squid, smelt, shrimp

Physical Characteristics: The cownose ray has a width of up to three feet and is 1.7 times wider than it is long. It is brownish above and white or yellow-white below. The front of its head is relatively concave, resembling a cow's nose. Its eyes are on the side of its head, and it has seven rows of large, flat, plate like teeth. The cownose ray has long, pointed wings with nearly straight front edges and concave rear edges. It does not have a swim bladder, so it tends to sink. The tail is whip-like. A venomous tail spine is immediately behind the dorsal fin. Spongy venom glands produce the toxin along the underside of the spine. The skeleton is composed of cartilage, not bone, and the skin is smooth.

Behavior: Cownose rays rarely rest on the bottom like the other rays. They are migratory, and school in groups of 5-200 individuals when searching for food. Rapid wing movements churn the sediment to uncover hidden clams and oysters, which are crushed by the beak-like mouth to retrieve the meat inside. The schools "fly" gracefully just below the surface, and when their wing tips break the surface, they have a remarkable resemblance to the dorsal fins of a shark.

Reproduction: The cownose ray is *ovoviviparous*. It bears live young, which emerge tail first. The young are usually born in mid-June and are about 11-18 inches wide.



Animal Facts:
Clownfish

Family: Pomacentridae

Scientific Name:
Amphiprion percula (percula clownfish)
Amphiprion melanopus (red and black clownfish)
Amphiprion polymnus (saddleback clownfish)
Premnas biaculeatus (maroon clownfish)

Range: Tropical Indo-Pacific Oceans

Habitat: Coral reefs

Natural Diet: Crustaceans (small marine animals) and plants; leftovers from fish consumed anemones

Zoo Diet: Smelt, krill, and squid

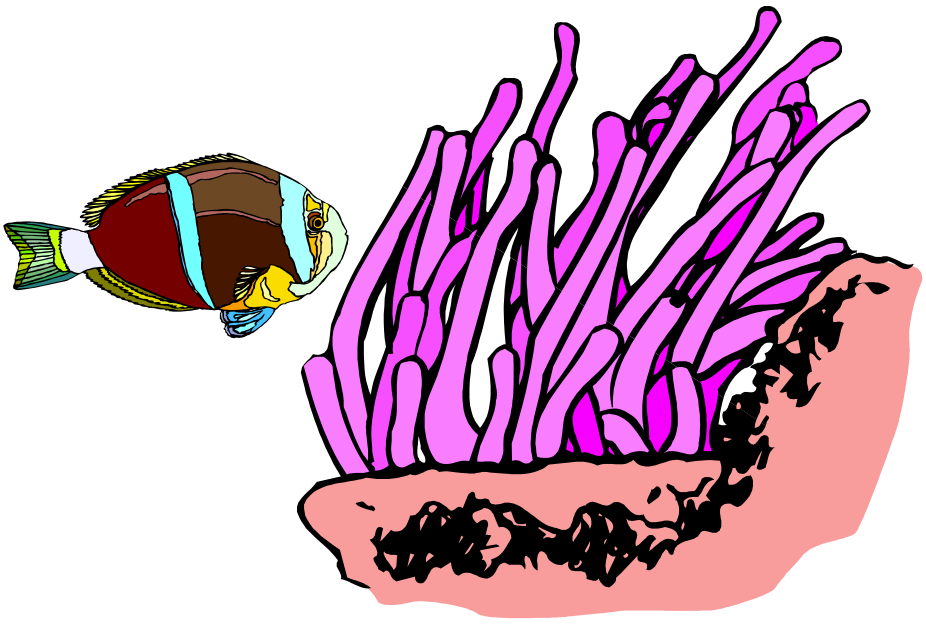
Physical Characteristics: Clownfish are 1.5 to 3 inches long. They have a vivid orange and white or red and white striped markings with black borders. All clownfish are male at birth, but dominant fish become females later in life.

*Percula Clownfish have broad bands of orange and white with their fins outlined in black.

*Maroon Clownfish are more heavily built than the other species of clownfish and have narrow white bands.

Behavior: Clownfish have a symbiotic (mutually beneficial) relationship with the poisonous anemone. In order for them to live among the stinging tentacles, they must first cover themselves with a coating of mucus to become immune to the stings. They are then immune only to that particular species of anemone, and can still be stung by other species of anemone. The clownfish relies on the anemone for protection and in return the anemone eats scraps of food dropped by the clownfish.

Reproduction: External fertilization: The eggs are laid in large batches on coral or rocks, and are fertilized by the male. The eggs are protected by both parents until they hatch in 4-5 days.



Animal Facts:
Butterflyfish

Family: Chaetondontidae

Scientific Name:
Chaetodon ephippium (saddleback butterflyfish)
Chaetodon lunula (raccoon butterflyfish)
Heniochus acuminatus (pennant butterflyfish)
Chelmon rostratus (copperband butterflyfish)

Range: Atlantic, Pacific, and Indian Oceans; Caribbean Sea

Habitat: Coral reefs bordering tropical seas and oceans

Natural Diet: Mainly coral polyps, algae, seaweed, bottom-dwelling shrimp, crabs, worms

Zoo Diet: Capelin, krill, squid

Physical Characteristics: Butterflyfish are 4-8 inches long and have bright patterns and colors (frequently yellow). They have slim, disc-like bodies for easy access to coral. Many of the species' faces and eyes are masked with dark bands and "eye spots" are near the tail to confuse predators. Butterflyfish have bristly teeth that line the mouth, which is well-adapted for scraping reef surface. Some of the species have long, pipe-like snouts for plucking food from narrow coral crevices.

*Saddleback butterflyfish have a black "saddle" across the back, bordered with a white band, and a black vertical bar through the eyes.

*Pennant butterflyfish are eight inches long and white with two wide black stripes and a yellow tail.

*Copperband butterflyfish have four deep orange-gold vertical stripes on silvery-white ground. The first stripe covers the eye, and there is also a false "eye spot."

Behavior: Butterflyfish are nocturnal and swim in pairs. They disappear from the reef scene at night when larger sea animals move into feed. Some species fade in color at night for protection.

Reproduction: External fertilization. Eggs are laid on coral or rocks and fertilized by the male. Both parents stay with the eggs until they hatch in 4-8 days.

Animal Facts:
Blacktip Shark

Family: Carcharhinidae

Scientific Name: *Carchahinus melanopterus*

Range: Indian Ocean, central Pacific Ocean

Habitat: Shallow waters, especially near the islands and atolls common to the South Pacific; very common in coral reefs and shallow lagoons.

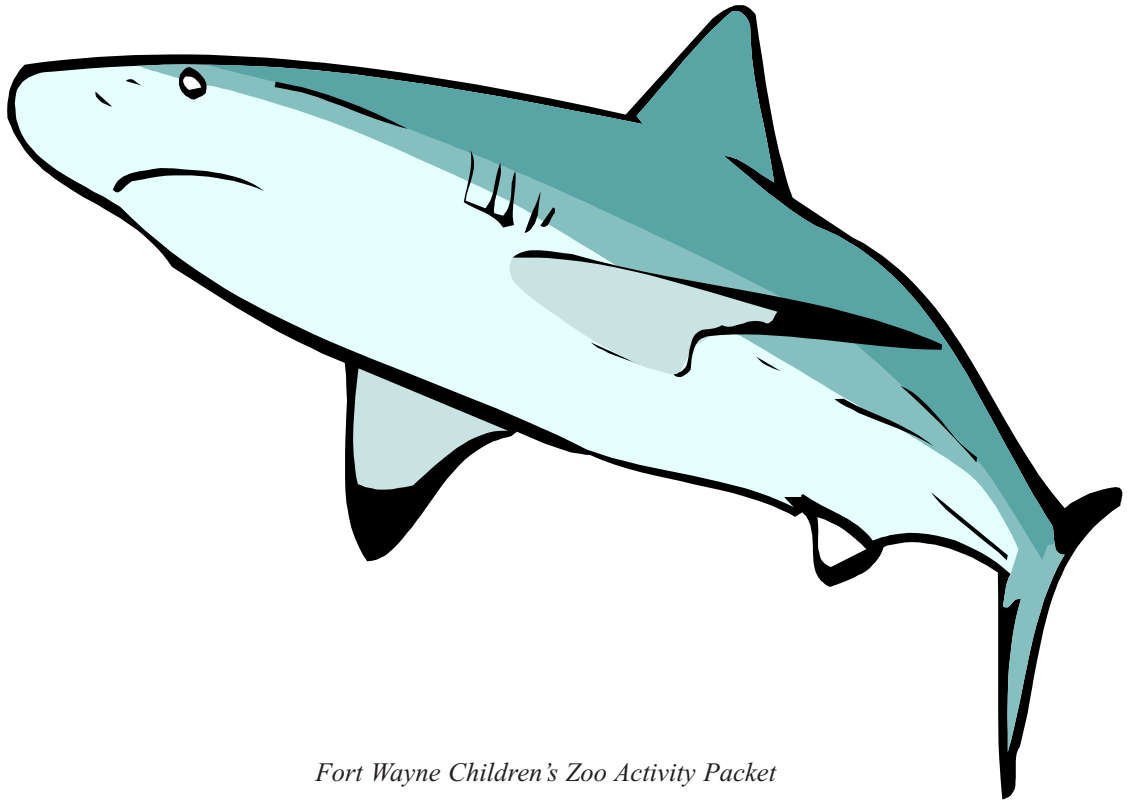
Natural Diet: Fish, squid, octopus, crustaceans

Zoo Diet: Squid, smelt, shrimp

Physical Characteristics: Blacktip sharks are 18 inches to 6 feet long and can weigh over 99 pounds. Their body is streamlined and light brown to grey on the upper body with black tips on the fins and a white underside. They have a blunt, round nose and horizontally oval eyes. Their teeth are long, thin, and serrated.

Behavior: The blacktip shark is both diurnal and nocturnal**.** It is an active, powerful swimmer and usually swims alone or in small groups. It often follows the tide in and out searching for food. The shark is timid, not aggressive, and seldom attacks humans. The most important sensory function of a blacktip shark is its sense of smell, which occupies 70% of the shark's brain function.

Reproduction: Fertilization is internal. Blacktip sharks are *viviparous* (live bearing). Two to four pups are born with yolksac-placenta attached. Births take place in late winter to early summer after a gestation of possibly 16 months.



Evaluation Form

Zoo Activity Packet

Dear Teacher:

Please take a few minutes to fill out and return this evaluation form. Your input will help us improve our teacher resource materials in the future.

Return in the envelope provided or mail to Education Department, Fort Wayne Children's Zoo, 3411 Sherman Blvd., Fort Wayne, IN 46808. Thank you for your time and effort!

SCHOOL or GROUP NAME: _____

GRADE LEVEL: _____ DATE OF VISIT: _____

1. Were the materials and activities appropriate for your grade level? _____

_____

2. Which work sheet did you use? _____

_____

3. Which activities did you try? _____

_____

4. Which of these were enjoyed most by your students? _____

_____

5. Did you create or modify any activities to supplement this packet? If so, we would appreciate receiving a copy to include in future packets or to distribute to teachers on request.

6. What other materials would you like to see included in the packet? _____

_____

7. Additional comments: _____

_____

_____

_____